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Seven New Chironomid Species (Diptera, Chironomidae) from Japan

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Abstract

Seven new species of chironomids from Japan, belonging to 5 genera, including a new genus *Neobrillia*, and *Nanocladius*, *Paracladopelma*, *Polypedilum* and *Tanytarsus*, were described on the basis of adult male morphology.

Key words: chironomid, new species, adult male, morphology

1. Introduction

Chironomid midges are sometimes considered a nuisance due to their seasonal mass emergence, and they also have been highlighted as an important environmental allergen in recent years (MURAKAMI *et al.*, 1986; KINO *et al.*, 1987). On the other hand, chironomid larvae are a dominant member of benthic communities in a variety of inland waters, and they can be used as an excellent indicator of water quality (KAWAI *et al.*, 1989). Recently, SASA (1989a) compiled a list of 480 species recorded in Japan and East Asia as of December 1988 and proposed a provisional key to males of all the species. However, Japanese chironomid fauna still requires further elucidation.

In this paper, seven new species, recovered from various inland waters at different localities and at different saprobic levels in Japan in the course of the assessment of the usefulness of larval chironomid communities as water quality indicators, were described on the basis of adult male morphology.

2. Materials and methods

All the materials used for descriptions were adult males that emerged from various bottom samples collected from rivers and lake-littorals in different regions. The methods for collection of bottom samples and mounting and identification of adult males have already been described in KAWAI *et al.* (1989). Type materials have been temporarily deposited in the Department of Bacteriology and Immunology, School of Medicine, Toyama Medical and Pharmaceutical University, Japan.

The abbreviations in the descriptions of species mean the following measurements and ratios cited from SASA (1989a), with some modifications.

BL: body length, or the combined length in mm of thorax and abdomen in slide-mounted specimens.
WL: wing length, or the distance between tip of wing and arculus.
AR: antennal ratio, obtained by dividing the length of the last antennal segment with the combined length of the remaining flagellar segments (not including pedicel).
ER: eye ratio, obtained by dividing the distance between dorsomedian corners of two eyes with the height of an eye.
SO: number of supraorbital setae on one side.
CL: number of clypeal setae.
PN: number of setae on antepronotum on each side.
DM: number of dorsomedian setae on scutum.
DL: number of dorsolateral setae on each side of scutum.
SA: number of supraalar setae on each side of scutum.
PA:number of prealar setae on each side of

scutum.

SC: number of setae on scutellum.

SQ: number of fringe setae of squama.

LR1: front leg ratio, obtained by dividing the length of front tarsal segment I with the length of front tibia.

LR2: ratio obtained by dividing the length of middle tarsal segment I with the length of middle tibia.

LR3: ratio obtained by dividing the length of hind tarsal segment I with the length of hind tibia.

TR1: ratio obtained by dividing the length of front tarsal segment V with the length of front tibia.

BR1: front beard ratio, obtained by dividing the length of the longest hair on front tarsal segment I with the diameter of the segment at the base of the hair.

BR2, BR3: same, referring to the beard ratio of middle and hind tarsal segment I.

3. Description of adult males

3-1. Subfamily Orthocladiinae

Neobrillia gen. nov.

Type species: *Neobrillia longistyla* sp. nov.

Diagnostic characters: Separable from other genera of Orthocladiinae in having antenna with 13 flagellar segments, bare eyes, wing membrane densely covered with macrotrichiae all over, almost straight vein Cul, normally developed anal tergite without anal point, and simple and sickle-shaped gonostylus with a megaseta.

Neobrillia longistyla gen. nov., sp. nov.

MALE ($n=2$)

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume brown. Scutal ground pale yellow. Scutal stripes pale brown. Scutellum pale yellow. Postnotum pale brown. Front femora yellowish pale brown, slightly darkened distally. Front tibia and tarsus brown. Middle and hind legs pale yellow. Abdominal tergites pale brown; tergites III-VI slightly darkened orally.

Structure: AR 1.40-1.46. Tip of antenna with several curved sensory setae and a distinct long seta (Fig. 1a). Head as in Figure 1b. SO 31-41. Eyes with long dorsomedian projections; ER 0.26-0.34. Maxillary palp 5-segmented. CL 25-28. Antepronotum with 28 setae distributed all over (Fig. 1c). Scutum as in Figure 1d. DM 0. Dorsolateral setae 63-76, forming 2-5 rows and all arising from large pale pits. SA 1. PA 22-29. SC 35-51. Wing as in Figure 1e. SQ 23-26. Anal lobe moderately developed. Costa slightly produced beyond R4+5. R1 and R4+5 running very closely. R2+3 running separate from both R1 and R4+5 and ending very close to R1. R4+5 ending well distal to end of M3+4. RM very long and oblique. Cul almost straight. LR1 0.91-0.93; LR2 0.49-0.51; LR3 0.52-0.55. TR1 0.12-0.13. BR1 2.8-3.5; BR2 4.5-6.8; BR3 3.2-5.3. Front tibia with a spur; middle tibia with 2 spurs subequal in length; hind tibia with outer spur about three-fourths length of inner spur and a tibial comb consisting of 10-11 stout setae (Figs. 1f-h). Tarsal pseudospurs absent. Small pulvilli present (Fig. 1i). Tarsal claws with pointed apex. Abdominal tergites with numerous long setae distributed almost evenly on the entire surface (Fig.1j). Hypopygium as in Figure 1k. Ninth tergite without a reticular area. Virga absent. Gonocoxite long, slightly tapered distally. Superior volsella long, finger-like, dorsally bare and ventrally with about 15 short setae on distal half. Distomedial lobe barely developed. Gonostylus extremely long, sickle-shaped, with about 8 short setae on distal half and a megaseta.

Size: BL 5.25 mm WL 2.21-2.94 mm

Larval habitat: Unpolluted small mountainous stream.

Type material: Holotype ♂ emerged from a bottom sample collected from a small tributary to Lake Okutama (Tokyo Metrop.) on 12 December 1983; paratype ♂ from the same sample as holotype.

Discussion; The new genus *Neobrillia* seems closely related to *Brillia* KIEFFER and *Xylotopus* OLIVER in that the antepronotal setae are distributed all over, wing membrane is covered with macrotrichiae, and RM is very long. However, it is easily distinguishable from the latter two genera in having a simple (not bifur-

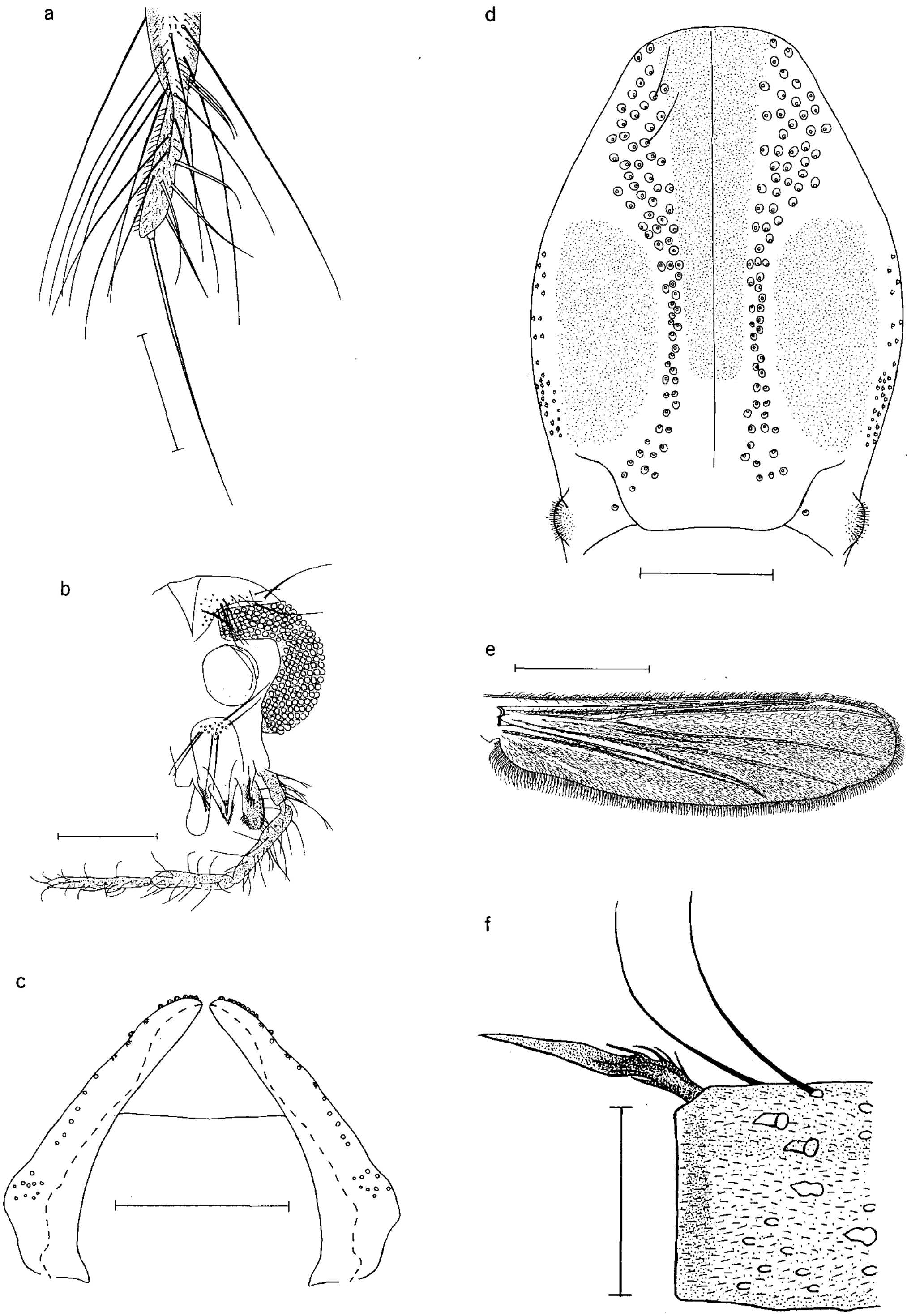

Fig. 1. *Neobrillia longistyla* gen. nov., sp. nov. Male. a, tip of antenna; b, head; c, antepronotum; d, scutum; e, wing; f, tip of front tibia; g, tip of middle tibia; h, tip of hind tibia; i, pulvilli, empodium and claws; j, abdominal tergite IV; k, hypopygium. Scale: 1 mm in Fig. 1e, 0.25 mm in Figs. 1b-d and j, 0.1 mm in Fig. 1k, 0.05 mm in Figs. 1a and f-i.

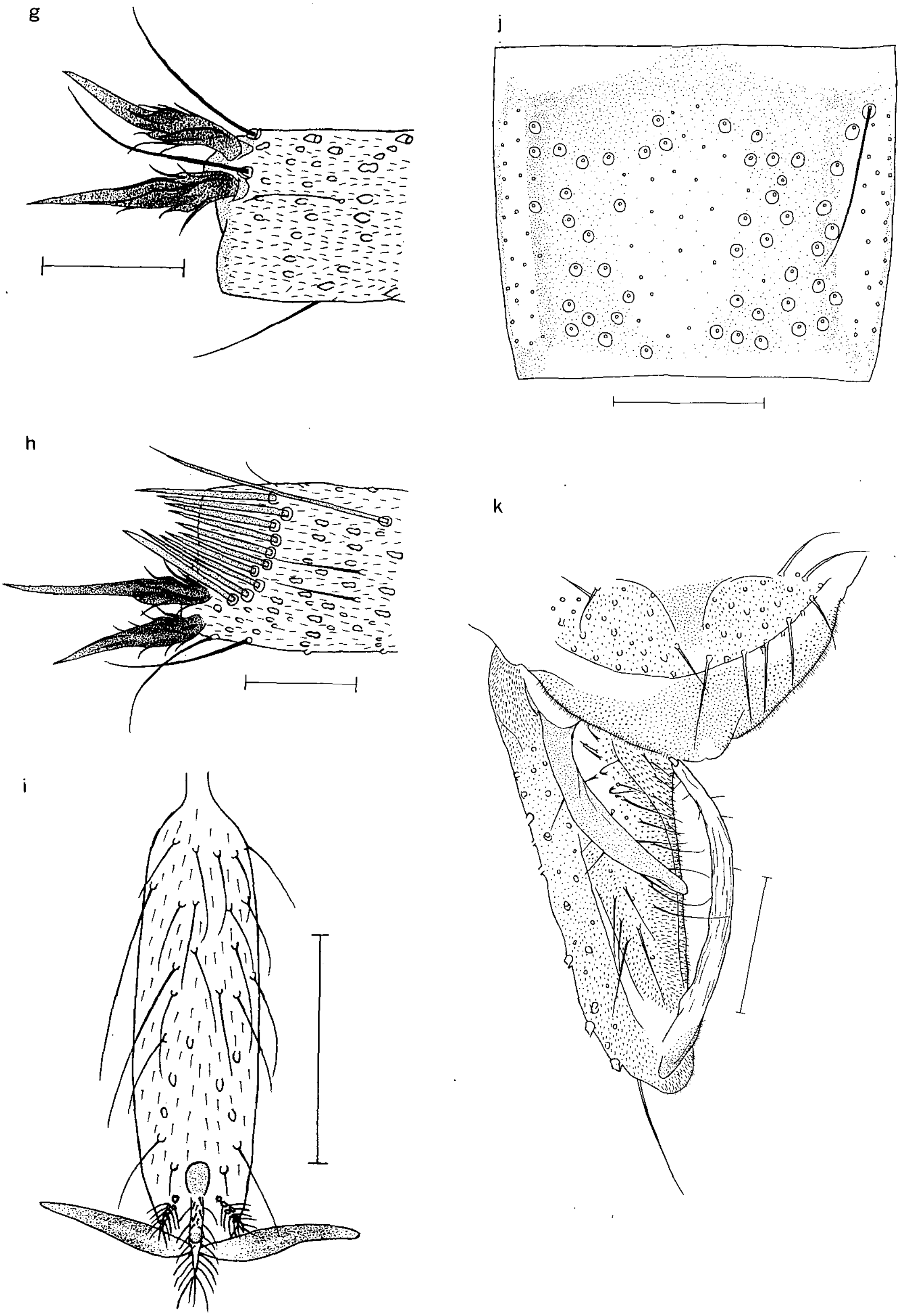

Fig. 1. continued.

cate) gonostylus. It also differs from *Brillia* in that the gonostylus has a megaseta, and from *Xylotopus* in that the antenna has a subapical distinct seta and the distomedial lobe of gonocoxite is barely developed (see WIEDERHOLM, 1989).

Nanocladius pulcher sp. nov.

MALE ($n=2$)

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume yellowish brown. Scutal ground pale yellow. Scutal stripes yellowish brown. Scutellum pale brown. Postnotum brown. Halteres pale yellow. Legs almost uniformly pale yellow. Front tibia slightly darkened. Abdominal tergites as in Figure 2a. Tergites I, II and VI-VIII pale yellow. Tergite IX pale brown. On tergites III-V, oral 1/3-1/2 pale yellow and caudal 2/3-1/2 pale brown.

Structure: AR 0.50-0.66. Genae clearly excavated. SO 1-2. Eyes pubescent and pyriform; ER 1.47-1.67. CL 5. Antepronotum well developed. PN 1-3. Dorsomedian setae only 2, arising from the same pit. Dorsolateral setae 6, arising from pale pits. PA 1. SA 0. Scutellum with only 2 setae, arising from pale pits. Wing as in Figure 2b. SQ 1. Anal lobe rounded. Costa distinctly produced beyond R4+5. R4+5 ending well proximal to tip of M3+4. R2+3 running very close to R4+5 and fused with it halfway. FCu well beyond RM. Cu1 straight. An ending proximal to FCu. LR1 0.60-0.62; LR2 0.39; LR3 0.50-0.51. TR1 0.14-0.18. BR1 2.2-2.5; BR2 1.7-3.0; BR3 2.3-2.6. Tarsal pseudospurs absent. Abdominal tergites II-VIII with only 4 setae in a row (Fig. 2a). Setae on tergites III-V arising from large pale pits. Setae on other tergites arising from small pits. Hypopygium as in Figure 2c. Anal point needle-like, without lateral setae or microtrichiae, and with 4-5 basal setae. Inferior volsella conical and apically pointed. Gonostylus short, straight and apically truncate.

Size: BL 1.25-1.72 mm WL 0.70-0.99 mm

Larval habitat: Pool of unpolluted mountainous river.

Type material: Holotype ♂ from a sample collected at Nakanokochi from Oyabe River (Toyama Pref.) on 29 May 1984. Paratype ♂ from a sample collected at Kobotoke (Tokyo Metrop.) from Minamiasakawa River on 11 December 1983.

Discussion: This species is somewhat related to *N. balticus* (PALMÉN) in coloration and the structure of hypopygium, but clearly differs from the latter in that the abdominal tergites III-V and IX are brownish, remaining tergites are yellowish, the number of setae on tergites II-VIII is only 4, and the setae on tergites III-V arise from distinct pale pits (see FITTKAU and LEHMANN, 1970).

3-2. Subfamily Chironominae

Paracladopelma nudiappendiculata sp. nov.

MALE ($n=1$)

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume brown. Scutal ground pale yellow. Scutal stripes yellowish brown. Scutellum pale yellow. Postnotum pale brown. Legs almost uniformly pale yellow, front tarsus slightly darkened. Abdomen pale yellow, slightly darkened distally.

Structure: AR 1.35. SO 12. Eyes bare, with long dorsomedian projections; ER 0.2. Only minute frontal tubercles present. CL 16. PN 6. DM 19. DL 15. PA 3. SA 1. SC 17. SQ 3. Wing membrane without marks or clouds. Anal lobe rounded. Costa ending at tip of R4+5. R2+3 running separate from both R1 and R4+5 and ending closer to end of R1 than to that of R4+5. R4+5 ending above apex of M1+2. FCu well beyond RM. LR1 2.05; LR2 0.55; LR3 0.64. TR1 0.27. Hypopygium as in Figure 3. Anal tergite bands completely fused. Anal point long and slightly expanded distally. Superior volsella pad-like, composed of dorsal quite bare lobe and ventral pubescent lobe and with 2 distinct setae along inner margin of dorsal lobe. Inferior volsella small, but set off as distinct lobe, and pubescent pad-form without long setae. Gonostylus almost straight.

Size: BL 3.17 mm WL 1.56 mm

Larval habitat: Pool of unpolluted mountainous river.

Type material: Holotype ♂ from a sample collected at Nakanokochi from Oyabe River on

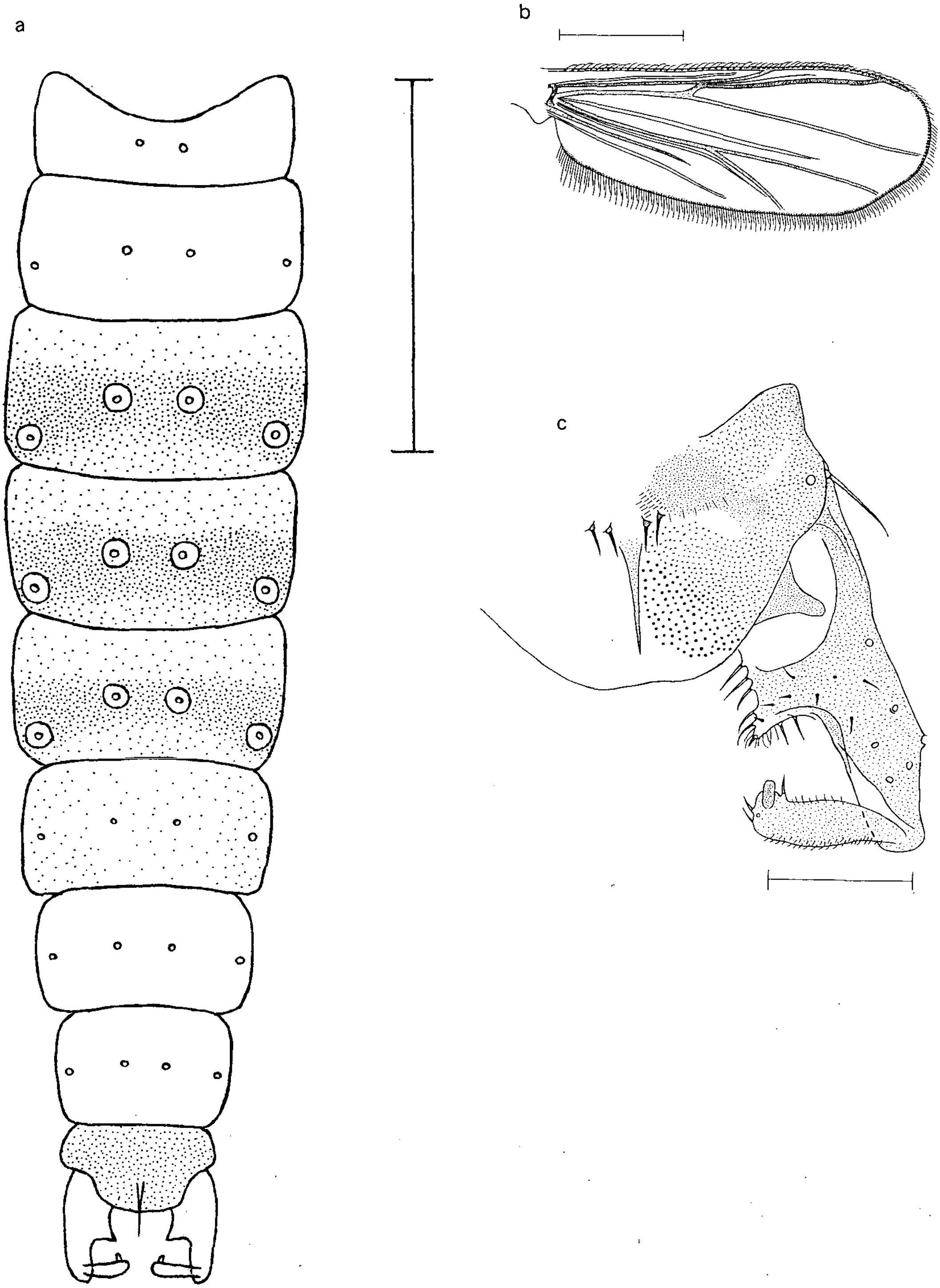

Fig. 2. *Nanocladius pulcher* sp. nov. Male. a, Abdominal tergites; b, Wing; c, Hypopygium. Scale: 0.25 mm in Figs. 2a and b, 0.025 mm in Fig. 2c.

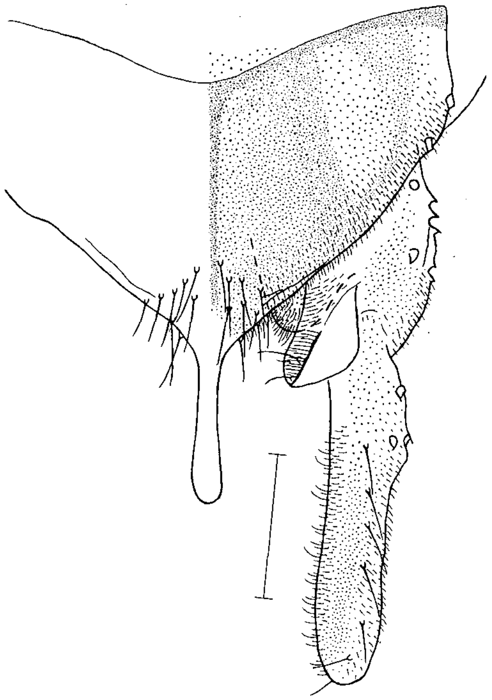

Fig. 3. Male hypopygium of *Paracladopelma nudiappendiculata* sp. nov. Scale: 0.05 mm.

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Discussion: This species is considered to belong to the genus *Paracladopelma* HARNISCH, since the superior volsella is pad-form and covered with microtrichiae, inferior volsella is set off as a distinct lobe and anal tergite bands are completely fused. Among the known species of *Paracladopelma*, this one seems somewhat related to *P. doris* (TOWNES) in the structure of superior volsella. However, it clearly differs from the latter in that the ventral setiferous lobe of superior volsella is not covered by the dorsal bare lobe in dorsal view, and the gonostylus is almost straight (see TOWNES, 1945).

Paracladopelma pugna sp. nov.

MALE ($n = 1$)

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume brown. Scutal ground pale yellow. Scutal stripes yellowish brown, rather inconspicuous. Scutellum pale yellow. Postnotum yellowish brown. Halteres pale yellow. In front legs, tarsal segments II-V, distal half of tarsal segment I, tibia, and apical part of femur slightly darkened. Middle and hind legs uniformly pale yellow. Abdominal tergites pale yellow, slightly darkened distally.

Structure: AR 1.08. SO 9. Eyes with long dorsomedian projections; ER 0.2. Small frontal tubercles present. CL 16. PN 4. DM 10. DL 10. PA 3. SA 1. SC 13. SQ 1. Wing membrane without marks or clouds. Anal lobe rounded. Costa not produced beyond tip of R4+5. R2+3 running separate from both R1 and R4+5 and ending closer to end of R1 than to that of R4+5. R4+5 ending above apex of M1+2. FCu well beyond RM. LR1 2.06; LR2 0.52; LR3 0.63. TR1 0.33. BR1 2.1; BR2 2.6; BR3 2.2. Hypopygium as in Figure 4. Anal tergite bands completely fused. Anal point long, only slightly expanded distally. Superior volsella like a pubescent 'fist', and with 2 setae on inner margin. Inferior volsella set off as distinct lobe, small pubescent pad-form and without long setae. Gonostylus almost straight.

Size: BL 2.96 mm WL 1.35 mm

Larval habitat: Pool of unpolluted mountainous river.

Type material: Holotype ♂ from a sample collected at Nakanokochi from Oyabe River on 29 May 1984.

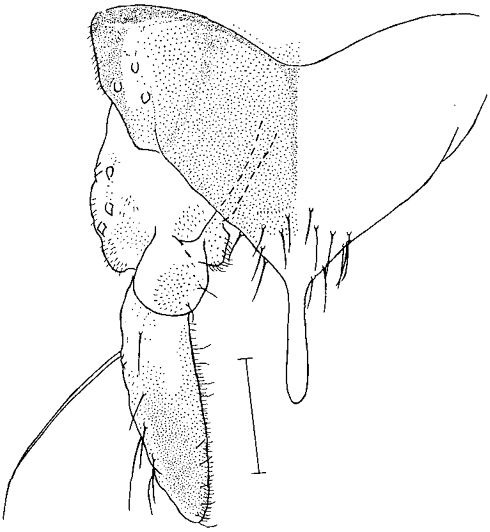

Fig. 4. Male hypopygium of *Paracladopelma pugna* sp. nov. Scale: 0.05 mm.

Discussion: Among the known species of *Paracladopelma*, this one is somewhat related to *P. kuramaclara* SASA in the coloration and structure of hypopygium, but is quite different from the latter in having a rounded superior volsella and a distally tapered gonostylus (see SASA, 1989b).

Polypedilum caudocula sp. nov.

MALE (n=2)

Coloration (in specimen mounted in gum-chloral): Almost uniformly brown. Legs pale brown.

Structure: AR 1.32. SO 10-12. Eyes bare, with long dorsomedian projections; ER 0.23-0.29. Frontal tubercles absent. CL 13-15. Antepronotum reduced and narrowly separate in the middle. PN 0. DM 12-15. DL 12-13. PA 4. SA 0. SC 10. Wing as in Figure 5a. SQ 7. Wing membrane with only faint clouds on the basal part of cells r4+5 and m3+4, the middle part of cells m1+2 and an and around the vein Cu1. Anal lobe rounded. R2+3 running well separate from both R1 and R4+5 and ending well distal to tip of R1. FCu far beyond RM. LR1 1.65; LR2 0.53; LR3 0.67. TR1 0.3. BR1 3.8; BR2 4.2-5.9; BR3 8.5-9.8. Terminal scale of front tibia sharply pointed apically and with 3 long setae at the base. Hypopygium as in Figure 5b. Ninth tergite caudally with a pair of human eye-shaped processes. Anal point long, gradually tapering to the truncate apex. Superior volsella robust pubescent pad-like and with apical 2 strong bristles on inner margin and 2 lateral long setae. Inferior volsella straight, dorsally with 13 strong curved bristles on apical half and ventrally with a long straight apical bristle. Gonostylus slender, distally tapered.

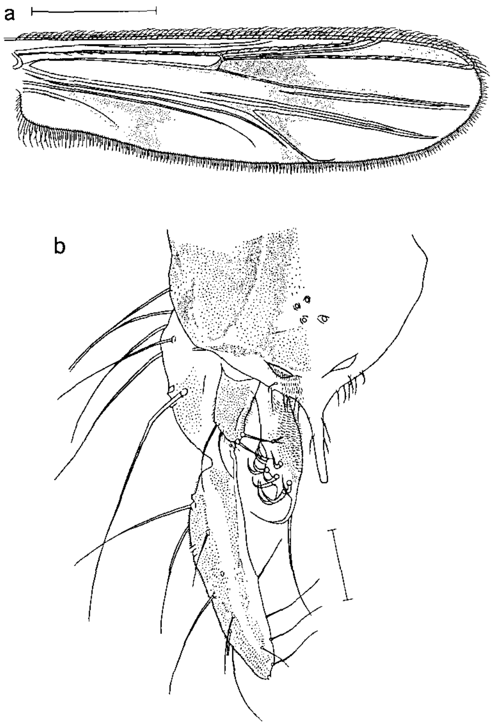

Fig. 5. *Polypedilum caudocula* sp. nov. Male. a, wing; b, hypopygium. Scale: 0.5 mm in Fig. 5a, 0.05 mm in Fig. 5b.

Size: BL 3.35 mm WL 1.85-1.98 mm

Larval habitat: Littoral zone of pond.

Type material: Holotype ♂ from a sample collected from a pond near Kureha Country Club (Toyama Pref.) in April 1983. Paratype ♂ from the same sample as holotype.

Discussion: This species is somewhat related to *P. albosignatum* KIEFFER in the shape of superior volsella, but is easily distinguishable from the latter by having a narrow anal point and robust gonostylus and inferior volsella (see FREEMANN, 1958).

Tanytarsus angulatus sp. nov.

MALE (n=28)

Coloration (in specimen mounted in gum-chloral): Antennal shaft and plume brown. Scutal ground pale yellow. Scutal stripes yellowish pale brown and inconspicuous. Scutellum pale yellow. Postnotum yellowish pale brown. Halteres pale yellow. Legs and abdomen uniformly pale yellow.

Structure: AR 1.10-1.36 (1.24 in average). SO 10-13 (11). Eyes bare and with conspicuous dorsomedian projections; ER 0.69-0.83 (0.78). Frontal tubercles prominent, conical, 57 μm long and 13 μm wide at the base. CL 10-21 (16). PN 0. DM 9-15 (11). DL 8-12 (9). PA 1-2 (1). SA 0. SC 6-8 (7). Wing as in Figure 6a. Not cuneiform, anal lobe slightly developed. Macrotrichiae rather dense on apical half, scanty on basal half. R1 and R4+5 running close together. R2+3 end-

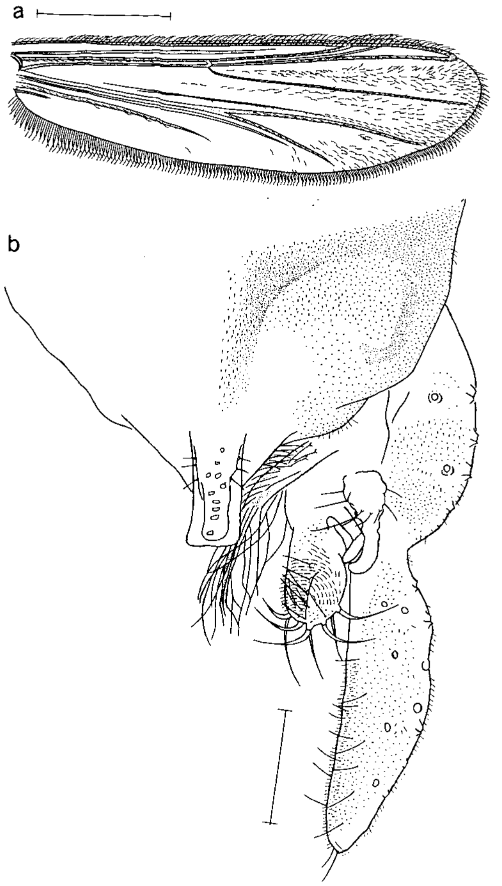

Fig. 6. *Tanytarsus angulatus* sp. nov. Male. a, wing; b, hypopygium. Scale: 0.5 mm in Fig. 6a, 0.05 mm in Fig. 6b.

ing closer to end of R1 than to that of R4+5. R4+5 ending distal to apex of M3+4. FCu well beyond RM. LR1 2.28 - 2.64 (2.48); LR 2 0.53- 0.64 (0.6); LR3 0.65 - 0.71 (0.68). TR1 0.31- 0.38 (0.34). BR1 2.5-4.3 (3.3); BR2 4.6-7.8 (6.5); BR3 5.0-7.7 (6.2). Front tibia with a long, sharply pointed apical scale. Terminal combs of middle and hind tibia well separated, both with a spur. Pulvilli small. Hypopygium as in Figure 6b. Anal tergite bands far apart. Anal point characteristic to this species; broad, parallel-sided, apically angulate, with paired longitudinal crests and about 10 clusters of short spines between the crests. Superior volsella oriented backwards, distally narrowed and with 3 long setae on inner margin and 3 dorsal and 2 lateral short setae. Digitus conspicuous and almost completely separated from superior volsella in dorsal view and sometimes apically reversed. Inferior volsella slightly expanded apically and with 5 apical curved bristles, 8 straight dorsal setae and 3 long ventral bristles. Median volsella long, reaching a little beyond the tip of inferior volsella and with basal simple setae and distal numerous leaf-like setae.

Size: BL 2.76-3.64 (mean 3.22) mm WL 1.48-1.98 (mean 1.72) mm

Larval habitat: Sand or mud at stagnant part of rather polluted river.

Type material: Holotype ♂ from a sample collected near Matsuo Jinja from Dokawa River (Toyama Pref.) on 24 May 1983. Paratypes 13 ♂♂ from a sample collected from an agricultural canal near Toyama Prison (Toyama Pref.) in April to May 1983; 3 ♂♂ from the same sample as holotype; ♂ from a sample collected at Yasunoya-bashi from Matsu River (Toyama Pref.) on 24 May 1983; ♂ from a sample collected at Azumi-bashi from Matsu River on 10 November 1983; 6 ♂♂ from a sample collected at Hijiri-bashi from Oyabe River on 29 May 1984; ♂ from a sample collected at Azumi-bashi from Matsu River on 8 October 1984; ♂ from a sample collected at Kamei-bashi from Matsu River on 8 October 1984; ♂ from a sample collected near Matsuo Jinja from Sano River (Toyama Pref.) on 24 June 1986.

Discussion: Among the known species of *Tanytarsus* V. D. Wulp, this one seems somewhat related to *T. occultus* Brundin in the shape of its anal point. However, it is quite different from the latter in that the digitus is almost completely separated from superior volsella in dorsal view and the median volsella reaches beyond the tip of inferior volsella (see Reiss and Fittkau, 1971).

Tanytarsus motosuensis sp. nov.

Male ($n=22$)

Coloration (in specimen mounted in gum-chloral): Almost uniformly pale yellow. Antennal shaft and plume brown.

Structure: AR 0.98-1.24 (1.09). SO 7-10 (8). Eyes bare and with conspicuous dorsomedian

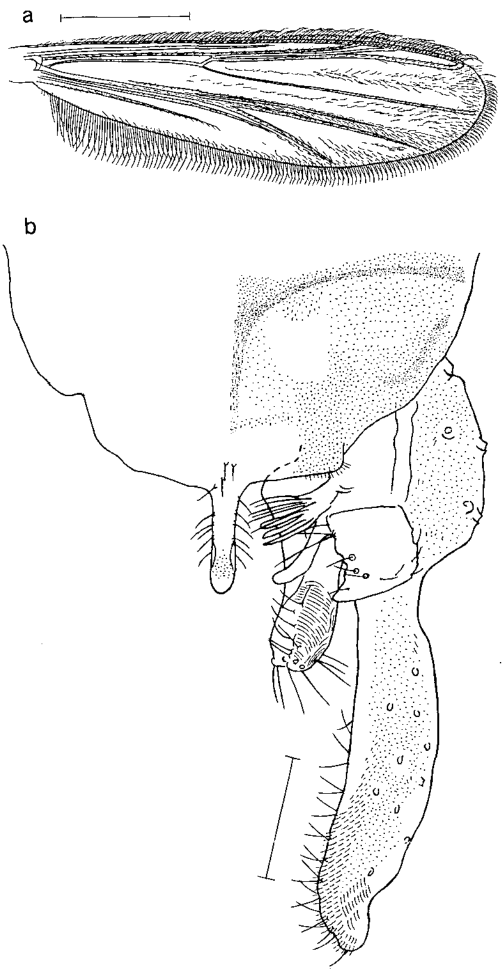

Fig. 7. *Tanytarsus motosuensis* sp. nov. Male. a, wing; b, hypopygium. Scale: 0.5 mm in Fig. 7a, 0.05 mm in Fig. 7b.

projections; ER 0.36-0.48 (0.42). Frontal tubercles absent. CL 13-21 (16). PN 0. DM 12-18 (15). DL 7-9 (8). PA 1. SA 0. SC 2-6 (4). Wing as in Figure 7a. Almost cuneiform. Macrotrichiae dense on apical half, scanty on basal half. R1 and R4+5 running close together. R2+3 ending about midway between ends of R1 and R4+5. R4+5 ending distal to tip of M3+4. FCu much beyond RM. LR1 2.79-3.07 (2.94); LR2 0.56-0.63 (0.6); LR3 0.66-0.72 (0.68). TR1 0.36-0.45 (0.42). BR1 2.7-3.7 (3.2); BR2 5.4-7.6 (6.6); BR3 5.4-7.5 (6.5). Front tibia with a long, sharply pointed apical scale. Terminal combs of middle and hind tibia well separated, both with a spur. Pulvilli vestigial. Hypopygium as in Figure 7b. Anal tergite bands fused to form Y-shape. Anal tergite without lateral spurs. Anal point without spine clusters or dorsal setae, and with about 10 lateral setae and a distal field of microtrichiae. Superior volsella large, with concave inner margin and with 2-3 strong basal setae, and 3-4 lateral and 5-6 short dorsal setae. Digitus long, clearly separated from superior volsella in dorsal view, and inwardly curved. Inferior volsella distally slightly curved inwardly. Median volsella short, with several lamellar setae and many simple setae. Gonostylus slender, constricted apically.

Size: BL 3.02-3.67 (mean 3.22) mm WL 1.61-1.79 (mean 1.74) mm

Larval habitat; Littoral zone of oligotrophic lake.

Type material: Holotype ♂ from a sample collected at littoral zone of Lake Motosu (Yamanashi Pref.) on 24 October 1984. Paratypes 12 ♂♂ from the same sample as holotype; 9 ♂♂ from a sample collected at the same locality as holotype on 29 October 1986.

Discussion: This species is somewhat related to *T. glabrescens* Edwards in the structure of hypopygium, but differs markedly from the latter in having superior volsella with concave inner margin, digitus clearly separated from superior volsella in dorsal view and anal point without dorsal setae (see Reiss and Fittkau, 1971).

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摘　要

日本産ユスリカ新種７種

日本各地の種々の陸水域において採集した底質サンプルから得られた *Neobrillia*（新属），*Nanocladius*，*Paracladopelma*，*Polypedilum* 及び *Tanytarsus* の五属に属する７種のユスリカ新種について，雄成虫の形態を記載した。

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